

Notice of Allowability

Application No.

09/623,281

Examiner

Kandasamy Thangavelu

Applicant(s)

BILLINGS ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to August 3, 2004.
2. ☒ The allowed claim(s) is/are 1-30 and 33-36.
3. ☒ The drawings filed on 21 November 2000 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

KEVIN J. TESKA
SUPERVISORY
PATENT EXAMINER

DETAILED ACTION

Introduction

1. This communication is in response to the Applicants' amendments dated August 3, 2004. Claims 1-9, 11-21, 23 and 25-28 were amended. Claims 31-32 were deleted. Claims 33-36 were added. Claims 1-30 and 33-36 of the application are pending.

Examiner's Amendment

2. Authorization for this examiner's amendment was given in a telephone interview with Mr. Frank Occhiuti on October 28, 2004.

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

3. The application has been amended as follows:

In Claim 10, change:

“(a) designing the non-linear system using the method as claimed in any of claims 1 to 9;”

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to

--(a) designing the non-linear system using the method as claimed in any of claims 1 to 9;--.

In Claim 21, change:

“A computer program product as claimed in claim 20, further comprising
selecting a time or spatial domain description of the generalized non-linear system;”

to

-- A computer program product as claimed in claim 20, further comprising computer
program instructions for
selecting a time or spatial domain description of the generalized non-linear system;--.

In Claim 23, change:

“A computer program product as claimed in any of claims 20 to 22, further comprising
determining a mapping between the time or spatial domain description of the generalised
nonlinear system and the frequency domain description of the generalised nonlinear system”

to

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-- A computer program product as claimed in any of claims 20 to 22, further comprising computer program instructions for
determining a mapping between the time or spatial domain description of the generalised nonlinear system and the frequency domain description of the generalised nonlinear system--.

In Claim 25, change:

“A computer program product as claimed in any of claims 20 to 24, further comprising
defining or determining a general relationship between the input and output frequency or
frequency ranges of the generalised non-linear system”

to

-- A computer program product as claimed in any of claims 20 to 24, further comprising computer program instructions for
defining or determining a general relationship between the input and output frequency or
frequency ranges of the generalised non-linear system--.

In Claim 27, change:

“said product further comprises computer instructions for”

to

-- said product further comprises computer program instructions for --.

In Claim 28, change:

“A computer program product as claimed in any of claims 20 to 27, further comprising computer instructions for”

to

-- A computer program product as claimed in any of claims 20 to 27, further comprising computer program instructions for --.

In Claim 30, change:

“A non-linear system to transferring energy from a time or spatial domain input signal having a first spectrum at a first pre-determinable frequency or range of frequencies”

to

-- A non-linear system for transferring energy from a time or spatial domain input signal having a first spectrum at a first pre-determinable frequency or range of frequencies--.

Reasons for Allowance

4. Claims 1-30 and 33-36 of the application are allowed over prior art of record.
5. The following is an Examiner's statement of reasons for the indication of allowable subject matter:

The closest prior art of record shows:

(1) a method of reducing co-channel interference in a predetermined frequency band in a received signal; the co-channel interference is cancelled by a complex signal limiter and non-linear filter; the outputs from the non-linear filter are supplied via a narrow band filter bank to a non-linear transform unit for producing an energy based demodulation signal from which time-varying coefficients of the null filter are obtained; the co-channel interference is further reduced by digitally processing the filtered limited signal samples and filtering the processed samples to remove components not in the specified frequency band; one of the plurality of filtered samples having a maximum momentary energy is identified; the identified filtered sample is selected as the sample having reduced co-channel interference (**Tong et al.**, U. S. Patent 5,995,565);

(2) an energy conserving, passive non-linear filter and filtering technique, for shifting and spreading spectral energy; non-linearities cause transfer of energy from low frequency modes of vibration to higher frequency modes of vibration; the digital passive non-linear filter receives traveling wave signals and passively modifies them to generate traveling wave signals having a different frequency spectrum without changing the received signal's energy content; the non-linear filter includes a memory element for retaining the internal energy state and a signal

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generator to generate the modified traveling wave signal (**Pierce et al.**, U. S. Patent 5,703,313);
and

(3) a chirp signal generated by filtering a click with an allpass filter; the chirp circuit includes an input waveform; the input signal is processed by a discrete Fourier transform (DFT) to convert the time domain signal to a frequency domain signal; an allpass filter processes the frequency domain signal to produce a chirp whose spectrum contains the same energy as the original signal, but whose energy is spread out in time due to phase shifting; the short duration signal is filtered by an allpass filter and transformed to a time domain signal using an inverse discrete Fourier transform (**Keefe et al.**, U. S. Patent 5,885,225).

5.1 Applicants' first set of claims consists of Claims 1-9 and 33.

Independent Claim 1 is directed to a computer implemented method for designing a non-linear system for transferring energy from a time or spatial domain input signal having a first spectrum at a first pre-determinable frequency or range of frequencies to a time or spatial domain output signal having a second spectrum at a second pre-determinable frequency or range of frequencies. The claim identifies the uniquely distinct features of:

“calculating, using a frequency domain description of said output signal, expressed in terms of a frequency domain description of said input signal and coefficients of a time or spatial domain description of a generalised nonlinear system, the coefficients of the time or spatial domain description of the generalised nonlinear system in order to give effect to the energy transfer”.

The closest prior art fails to teach or fairly suggest calculating, using a frequency domain description of said output signal, expressed in terms of a frequency domain description of said input signal and coefficients of a time or spatial domain description of a generalised nonlinear system, the coefficients of the time or spatial domain description of the generalised nonlinear system in order to give effect to the energy transfer. Therefore, Claims 1-9 and 33 are deemed novel and allowable.

5.2 Applicants' second set of claims consists of Claim 10.

Independent Claim 10 is directed to a method for realising or manufacturing a non-linear system for transferring energy from a time or spatial domain input signal having a first spectrum at a first pre-determinable frequency or range of frequencies to a time or spatial domain output signal having a second spectrum at a second pre-determinable frequency or range of frequencies. The claim identifies the uniquely distinct features of:

“calculating, using a frequency domain description of said output signal, expressed in terms of a frequency domain description of said input signal and coefficients of a time or spatial domain description of a generalised nonlinear system, the coefficients of the time or spatial domain description of the generalised nonlinear system in order to give effect to the energy transfer”.

The closest prior art fails to teach or fairly suggest calculating, using a frequency domain description of said output signal, expressed in terms of a frequency domain description of said input signal and coefficients of a time or spatial domain description of a generalised nonlinear

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system, the coefficients of the time or spatial domain description of the generalised nonlinear system in order to give effect to the energy transfer. Therefore, Claim 10 is deemed novel and allowable.

5.3 Applicants' third set of claims consists of Claims 11-19 and 34.

Independent Claim 19 is directed to a data processing system for designing a non-linear system for transferring energy from a time or spatial domain input signal having a first spectrum at a first pre-determinable frequency or range of frequencies to a time or spatial domain output signal having a second spectrum at a second pre-determinable frequency or range of frequencies. The claim identifies the uniquely distinct features of:

“means for calculating, using a frequency domain description of said output signal, expressed in terms of a frequency domain description of said input and coefficients of a time or spatial domain description of a generalised non-linear system, the coefficients of the time or spatial domain description of said generalised non-linear system in order to give effect to the energy transfer”.

The closest prior art fails to teach or fairly suggest means for calculating, using a frequency domain description of said output signal, expressed in terms of a frequency domain description of said input and coefficients of a time or spatial domain description of a generalised non-linear system, the coefficients of the time or spatial domain description of said generalised non-linear system in order to give effect to the energy transfer. Therefore, Claims 11-19 and 34 are deemed novel and allowable.

5.4 Applicants' fourth set of claims consists of Claims 20-28 and 35.

Independent Claim 20 is directed to a computer program product for designing a non-linear system for transferring energy from a time or spatial domain input signal having a first spectrum at a first pre-determinable frequency or range of frequencies to a time or spatial domain output signal having a second spectrum at a second pre-determinable frequency or range of frequencies. The claim identifies the uniquely distinct features of:

“calculating, using a frequency domain description of said output signal, expressed in terms of a frequency domain description of said input signal and coefficients of a time or spatial domain description of a generalised nonlinear system, the coefficients of the time or spatial domain description of the generalised nonlinear system in order to give effect to the energy transfer”.

The closest prior art fails to teach or fairly suggest calculating, using a frequency domain description of said output signal, expressed in terms of a frequency domain description of said input signal and coefficients of a time or spatial domain description of a generalised nonlinear system, the coefficients of the time or spatial domain description of the generalised nonlinear system in order to give effect to the energy transfer. Therefore, Claims 20-28 and 35 are deemed novel and allowable.

5.5 Applicants' fifth set of claims consists of Claims 29 and 36.

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Independent Claim 29 is directed to a non-linear system which can transfer energy from a time or spatial domain input signal having a first spectrum at a first pre-determinable frequency or range of frequencies to a time or spatial domain output signal having a second spectrum at a second pre-determinable frequency or range of frequencies. The claim identifies the uniquely distinct features of:

“means for giving effect to the energy transfer using coefficients of a time or spatial domain description a generalised non-linear system, said coefficients having been calculated using a frequency domain description of said output signal, for example, time output spectrum, expressed in terms of a frequency domain description of said input signal and coefficients of a time or spatial domain description of a generalised non-linear system”.

The closest prior art fails to teach or fairly suggest means for giving effect to the energy transfer using coefficients of a time or spatial domain description a generalised non-linear system, said coefficients having been calculated using a frequency domain description of said output signal, for example, time output spectrum, expressed in terms of a frequency domain description of said input signal and coefficients of a time or spatial domain description of a generalised non-linear system, as claimed by the Applicants. Therefore, Claims 29 and 36 are deemed nonobvious and allowable..

5.6 Applicants' sixth set of claims consists of Claim 30.

Independent Claim 30 is directed to a non-linear system for transferring energy from a time or spatial domain input signal having a first spectrum at a first pre-determinable frequency

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or range of frequencies to a time or spatial domain output signal having a second spectrum at a second pre-determinable frequency or range of frequencies. The claims identify the uniquely distinct features of:

“calculating, using a frequency domain description of said output signal, expressed in terms of a frequency domain description of said input signal and coefficients of a time or spatial domain description of a generalised nonlinear system, the coefficients of the time or spatial domain description of the generalised nonlinear system in order to give effect to the energy transfer”.

The closest prior art fails to teach or fairly suggest calculating, using a frequency domain description of said output signal, expressed in terms of a frequency domain description of said input signal and coefficients of a time or spatial domain description of a generalised nonlinear system, the coefficients of the time or spatial domain description of the generalised nonlinear system in order to give effect to the energy transfer. Therefore, Claim 30 is deemed novel and allowable.

6. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

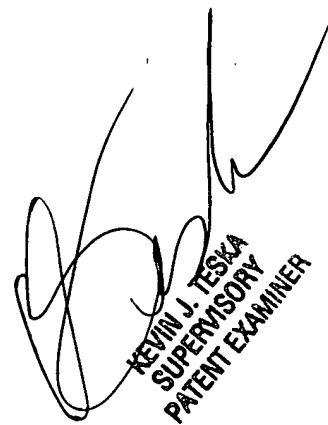
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7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kandasamy Thangavelu whose telephone number is 703-305-0043, till October 27, 2004 and 571-272-3717 after October 27, 2004. The examiner can normally be reached on Monday through Friday from 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin Teska, can be reached on (703) 305-9704, till October 27, 2004 and 571-272-3716 after October 27, 2004. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-9600.

K. Thangavelu
Art Unit 2123
October 28, 2004



KEVIN J. TESKA
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PATENT EXAMINER